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Attorney Docket No. 1700.89A **PATENT**
Confirmation No. 6616

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Michael J. Collins et al. Group Art Unit: 1743
Serial No.: 10/004,575 Examiner: Y. Gakh
Filed: December 4, 2001
For: METHOD AND APPARATUS FOR RAPID FAT CONTENT DETERMINATION July 21, 2003

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION – 37 C.F.R. § 1.192)

1. Transmitted herewith, in triplicate, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on May 22, 2003.

2. This application is filed on behalf of CEM Corporation, a small entity.

3. Pursuant to 37 C.F.R. § 1.17(c), the fee for filing the Appeal Brief is $160. Any additional fee or refund may be charged to Deposit Account 50-0332.

Respectfully submitted,

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D. Lawrence #14 7.30.03

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APPEAL BRIEF

(1) Real Party In Interest

The real party in interest is CEM Corporation, a North Carolina corporation that is assignee of the pending application.

(2) Related Appeals And Interferences

There are no pending related appeals or interferences. Applications based on the parent application have issued as U.S. Patents Nos. 6,548,303 and 6,548,304. A sibling application Serial No. 10/065,173 filed September 24, 2002 is pending and has been published as No. 2003-0124728 A1.

(3) Status Of Claims

Claims 1, 4-18, 21-28 and 31-42 are pending and appealed. Claims 2, 3, 19, 20, 29, 30, and 43-67 have previously been canceled.

(4) Status Of Amendments

No amendments have been filed subsequent to the final rejection.

07/24/2003 BABRAHA1 00000006 10004575
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07/24/2003 BABRAHA1 00000121 10004575
01 FC:2402 160.00 OP

(5) Summary Of Invention

The claimed invention is a method for rapid fat and oil content determination, optionally combined with moisture content determination, all from a single sample. Certain food products (e.g., meat) are examples of materials that contain fats and oils and moisture, and for which a determination of all three is typically desired or required. See, Page 7, lines 4-5.

Proton NMR spectroscopy offers a rapid technique for determining fat and oil content, but the most common and preferred technique s require the absence of water. Conventional drying techniques (e.g., heating or desiccation) can remove water, but frequently concurrently affect the fat and oil content. See, Page 3, lines 7-12.

The claimed invention uses microwave drying (to which water is particularly responsive, regardless of the temperature of the sample) to remove the water, followed immediately—and using the same sample—with a proton NMR determination of at least the fat and oil content, and optionally a gravimetric determination of the moisture content as well. See, Page 11, lines 1-28.

(6) Issues

A § 103 rejection has been applied using a primary reference that teaches the disadvantages of microwave drying and advocates the avoidance of microwave drying. The method of the primary reference also precludes moisture content analysis. Can the obviousness rejection of the claimed microwave-based technique be sustained in the face of the contrary teaching of the primary reference?

(7) Grouping Of Claims

Applicants request that at least two groups of claims be evaluated.

All of the pending claims deal with the determination of fat and oil content. Additionally, Claims 4, 18, 21 and 35 include the determination of the moisture content of the same sample.

(8) Argument

In the last office action prior to Appeal, mailed March 14, 2003 (Paper No. 11), the claims were rejected under § 103 combinations of Kock (GB 2 261 072) and Collins (US 4,554,132); or Kock and Collins and Jerosch-Herold (US 5,289,124). According to the Examiner, these patents render the claimed invention obvious under the *Graham v. John Deere* factors, 383 U.S. 1, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966).

Koch is cited for its use of NMR measurement of fats and oils. Koch deals with the moisture problem by adding calcium carbide (page 3 line 30) or calcium oxide (page 4 lines 4-7) to a sample to absorb water and prevent it from interfering with the NMR measurement.

Collins is cited for the moisture measurement capabilities of microwave instruments.

Jerosch-Herold is cited for the use of a Teflon wrapper for the NMR sample.

The Kock reference, however, discourages (teaches away from) the use of microwave for drying purposes prior to NMR analysis,

> "In order to perform such determination with a low resolution device, it has been necessary hitherto to eliminate the water by pre-drying in an oven, for example in a drying oven, a vacuum oven, a microwave oven, or the like. The need for such drying apparatus and the time needed are both disadvantages of this method."

(page 2, lines 13-18 of the '072 application). Accordingly, Kock supports the non-obviousness of the invention rather than its obviousness.

Additionally, because Kock requires adding a drying agent to a sample prior to NMR analysis, Kock's method is functionally incompatible with the claimed method of measuring fates, oils and moisture content in a single sample (e.g. claims 4, 18, 21 and 35) in which the sample is weighed and dried immediately prior to the NMR analysis.

Furthermore, because the samples typically analyzed in the claimed method are often heterogeneous or non-uniform materials such as food products, the ability to obtain the moisture and fat and oil content from single samples (e.g. claims 4, 18, 21 and 35) rather than combinations of multiple samples, offers a more accurate, faster, and thus advantageous method to the relevant industries.

The Collins '132 patent indeed demonstrates the moisture measurement capabilities of microwave instruments. Nevertheless, because Kock discourages the use of microwave instruments, any combinations of Kock with microwave instruments are logically incompatible, both internally and in comparison to the pending claims.

Jerosch-Herold is cited against certain of the dependent claims as showing the use of a Teflon wrapper for an NMR sample. This disclosure adds nothing that cures the deficiencies of Kock with respect to the pending independent claims. Furthermore, Jerosch-Herold teaches NMR analysis of "porous media" saturated with a liquid (*e.g.* Abstract, Summary, and claim 1) and thus fails to disclose or suggest NMR analysis of dried materials.

In evaluating obviousness, Applicants certainly concur that *Graham v. John Deere* represents the seminal case under the 1952 Act. Nevertheless, using *Graham's* well-established outline of analysis immediately leads to a conclusion opposite that of the examiner: the scope and content of the prior art demonstrate the non-obviousness of the claimed invention.

Specifically, because Kock teaches away from the use of microwave drying, it must be considered as evidence of nonobviousness rather than obviousness. *Graham's* progeny have always supported this conclusion (emphasis added):

> "Additionally, although the prior art taught placement of a microwave feed unit below a microwave oven, it taught away from placing an open feed unit below a self-cleaning common cavity oven because the art believed the unit would be contaminated." *Raytheon Company V. Roper Corp.* 724 F.2d 951, 960, (Fed. Cir. 1983)

> "Those fact findings, together with those on commercial success and the prior art's teaching away from location of the open waveguide at the bottom of a self-cleaning common cavity oven, are highly probative, objective criteria fully capable of serving as a foundation for the legal conclusion of nonobviousness." *Id* at 961

(evaluating the *Graham v. John Deere* factors in upholding the nonobviousness of a self-cleaning, combination thermal and microwave oven).

Teaching away as evidence of nonobviousness is also well-established in the relevant commentaries, e.g.,

> "Numerous decisions recognize that an invention that otherwise might be viewed as an obvious modification of the prior art will not be deemed obvious in a patent law sense when one or more prior art references "teach away" from the invention." 2-5 Chisum on Patents § 5.03 [G]

The teaching-away evidence of nonobviousness is also sometimes expressed as the requirement that a prior art reference be evaluated in its entirely, and not just for the portions most favorable to one side of the obviousness analysis. See, In *In re Wesslau*, 353 F.2d 238, (CCPA 1965), "it is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." 353 F.2d at 241.

Similarly, in *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, (Fed. Cir. 1986), *cert. denied*, 484 U.S. 823 (1987), the Federal Circuit held that a single line in a prior art reference should not be taken out of context and relied upon with the benefit of hindsight to show obviousness. Rather, a reference should be considered as a whole, and portions arguing against or teaching away from the claimed invention must be considered.

> "Barnes-Hind selected a single line out of the Caddell specification to support the above assertion: "one way in which this [forming ridgeless depressions] can be achieved is to use a laser with high enough intensity to vaporize the plate material without melting it." Col. 5, lines 53-54. This statement, however, was improperly taken out of context. As the former Court of Customs and Patent Appeals held:
>
> > 'It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art.'"

In the present case, the primary reference relied upon by the Examiner in the rejection teaches away from one of the two main claim elements: microwave drying. The Applicants are fully entitled to have this aspect of the reference applied to the obviousness analysis.

The Examiner has also conveniently ignored two other disadvantages of the Kock technique: (1) the reaction of calcium carbide and water forms highly-flammable acetylene C_2H_2) (page 3 lines 30-32); and (2) the amount of drying agent added prior to NMR must match the maximum expected water content of a sample that has not yet been analyzed for moisture (page 5 lines 10-18)

In the face of this evidence, Applicants submit that the claims are nonobvious, that the Examiner's conclusion should be reversed, and that the claims should be passed to allowance at the earliest possible date.

Respectfully submitted,

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Philip Summa

9. Appendix:

1. A method of rapidly and accurately determining the fat and oil content of a sample that also contains moisture in amounts that would otherwise preclude NMR determination of the fat and oil content, the method comprising:

weighing the sample;

drying the sample by subjecting the sample to electromagnetic radiation in the microwave frequencies;

transferring the entire sample to a proton pulse NMR analyzer that measures the relaxation times of protons in the sample in response to pulsed radio frequencies from the NMR analyzer;

measuring the pulse NMR response of the sample to identify the pulse NMR response of protons in the sample that are associated with fats and oils; and

comparing the pulse NMR response of the sample with the known pulse NMR response of similar samples of known fat and oil content to determine the fat and oil content in the sample.

2. (Cancelled)

3. (Cancelled)

4. A method according to Claim 1 further comprising:

weighing the sample prior to the step of drying the sample;

reweighing the sample after the step of drying the sample;

calculating the percentage of moisture based on the weight change during drying; and

calculating the fat and oil content based upon the weight of the sample prior to drying and the fat and oil content determined by NMR analysis.

5. A method according to Claim 1 wherein the step of drying the sample comprises placing the sample on a sample pad that is substantially transparent to microwave radiation and is free of atoms that would interfere with or mask the NMR response of the protons in the fats and oils in the sample.

6. A method according to Claim 5 wherein the pad is of low mass, porous, hydrophilic and lipophilic.

7. A method according to Claim 5 wherein the pad is formed from materials selected from the group consisting of glass fibers and quartz fibers.

8. A method according to Claim 1 comprising keeping the sample at a substantially constant temperature during the step of drying the sample.

9. A method according to Claim 8 comprising drying the sample at a temperature sufficient to melt at least a portion of the fat and oil in the sample.

10. A method according to Claim 5 wherein the step of transferring the sample to the NMR analyzer comprises transferring the complete sample on the sample pad to the NMR analyzer.

11. A method according to Claim 10 wherein the step of transferring the sample and the sample pad further comprises wrapping the sample and sample pad in a sheet material that is free of atoms that would interfere with or mask the NMR response of the protons in the fats and oils in the sample.

12. A method according to Claim 11 wherein the sheet material is polytetrafluoroethylene.

13. A method according to Claim 1 wherein the step of conducting the NMR analysis is performed at substantially the same temperature as the drying step.

14. A method according to Claim 1 further comprising the step of generating a plurality of NMR spectra of samples of known fat and oil content.

15. A method according to Claim 1 wherein the method is conducted for a plurality of samples immediately after one another.

16. A method according to Claim 15 wherein the analysis of the plurality of samples is conducted at a substantially constant temperature from sample to sample.

17. A method of rapidly and accurately determining the fat and oil content of a sample that also contains moisture in amounts that would otherwise preclude NMR determination of the fat and oil content, the method comprising:

placing the sample on a sample pad that is substantially transparent to microwave radiation and that is free of atoms that would interfere with or mask the NMR response of the protons in the fats and oils in the sample;

weighing the sample and the sample pad;

thereafter drying the sample by subjecting the sample and sample pad to electromagnetic radiation in the microwave frequencies;

transferring the entire sample on the sample pad to a proton pulse NMR analyzer that measures the relaxation times of protons in the sample in response to pulsed radio frequencies from the NMR analyzer;

measuring the pulse NMR response of the sample to identify the pulse NMR response of protons associated with fats and oils;

comparing the pulse NMR response of the sample with the known pulse NMR responses of similar samples of known fat and oil content to determine the fat and oil content in the sample; and

quantitatively determining the fat and oil content in the sample prior to drying.

18. A method according to Claim 17 comprising reweighing the sample and sample pad after drying the sample.

19. (Cancelled)

20. (Cancelled)

21. A method according to Claim 17 and further comprising calculating the percentage of moisture in the sample based on the weight change during drying.

22. A method according to Claim 17 comprising keeping the sample at a substantially constant temperature during the step of drying the sample.

23. A method according to Claim 22 comprising drying the sample at a temperature sufficient to melt at least a portion of the fat and oil in the sample.

24. A method according to Claim 17 wherein the step of transferring the sample on the pad further comprises wrapping the sample and pad in a sheet material that is free of atoms that would interfere with or mask the NMR response of the protons in the fats and oils in the sample.

25. A method according to Claim 17 wherein the step of conducting the NMR analysis is performed at substantially the same temperature as the drying step.

26. A method according to Claim 25 comprising measuring the NMR response immediately following the drying step.

27. A method according to Claim 17 further comprising the step of generating a plurality of NMR response of samples of known fat and oil content.

28. A method of rapidly and accurately determining the fat and oil content of a plurality of samples that also contain moisture in amounts that would otherwise preclude NMR determination of the fat and oil content, the method comprising:

weighing a first sample;

drying the first sample by subjecting the sample to electromagnetic radiation in the microwave frequencies;

transferring the entire first sample to a proton pulse NMR analyzer that measures the relaxation times of protons in the sample in response to pulsed radio frequencies from the NMR analyzer;

measuring the pulse NMR response of the first sample to identify the pulse NMR response of protons in the sample that are associated with fats and oils;

comparing the pulse NMR response of the first sample with the known pulse NMR responses of similar samples of known fat and oil content to determine the fat and oil content in the sample; and

repeating the above steps for a second sample.

29. (Cancelled)

30. (Cancelled)

31. The method according to Claim 28 wherein the second sample is weighed immediately after the first sample.

32. The method according to Claim 28 wherein the second sample is dried immediately after the first sample.

33. The method according to Claim 28 wherein the NMR response of the second sample is measured immediately after the NMR response of the first sample is measured.

34. The method according to Claim 28 wherein the steps of drying the sample and measuring the NMR response occur at substantially the same temperature for the plurality of samples analyzed.

35. A method according to Claim 28 further comprising:

weighing the first sample prior to the step of drying the first sample;

reweighing the first sample after the step of drying the first sample;

calculating the percentage of moisture in the first sample based on the weight change during drying;

calculating the fat and oil content of the first sample based upon the weight of the sample prior to drying and the fat and oil content determined by NMR analysis; and

repeating each of the above steps for the second sample.

36. A method according to Claim 28 wherein the step of drying the sample comprises placing the sample on a sample pad that is free of atoms that would interfere with or mask the NMR response of the protons in the fats and oils in the sample.

37. A method according to Claim 36 wherein the pad is of low mass, porous, hydrophilic and lipophilic.

38. A method according to Claim 36 wherein the pad is formed from materials selected from the group consisting of glass fibers and quartz fibers.

39. A method according to Claim 34 wherein the drying step is conducted at a temperature sufficient to melt at least a portion of the fat and oil in the sample.

40. A method according to Claim 28 wherein the steps of transferring samples to the NMR analyzer comprises transferring the complete sample on the sample pad to the NMR analyzer.

41. A method according to Claim 40 wherein the steps of transferring the sample and the sample pad further comprises wrapping the sample and pad in a sheet material that is free of atoms that would interfere with or mask the NMR response of the protons in the fats and oils in the sample.

42. A method according to Claim 41 wherein the sheet material is polytetrafluoroethylene.

43-67 (Cancelled)